
कृत्रिम रेशों से निर्मित टायर सूत, डोरी और
टायर डोरी कपड़ा — परीक्षण के तरीके

भाग 2 रैखिक घनत्व

(दूसरा पुनरीक्षण)

**Tyre Yarns, Cords and Tyre Cord
Fabrics Made from Man-Made
Fibres — Methods of Test**

Part 2 Linear Density

(Second Revision)

ICS 83.160 ; 59.060.01

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FOREWORD

This Indian Standard (Part 2) (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Technical Textiles for Mobiltech Applications Sectional Committee had been approved by the Textiles Division Council.

This standard was first published in 1968 and subsequently revised in 1989. The second revision has been made in the light of experience gained since its last revision and to incorporate the following major changes:

- a) The title of the standard has been modified; and
- b) The method of preparation of the test specimen has been updated.

This standard has been published in various parts. The other parts under this series are:

- Part 1 Definition of terms
- Part 3 Load and elongation characteristics
- Part 4 Dip pick-up
- Part 5 Heat shrinkage and heat shrinkage force
- Part 6 Wet contraction and contractile force
- Part 7 Heat degradation
- Part 8 Thickness
- Part 9 Sampling of tyre yarns, cords and tyre cord fabrics made from rayon
- Part 10 Creep
- Part 11 Commercial mass
- Part 12 Sampling of tyre yarns, cords and tyre cord fabrics made from polyamide
- Part 13 Static Adhesion of textile tyre cord to vulcanized rubber

The composition of the Committee responsible for the formulation of this standard is listed in Annex B.

In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'.

*Indian Standard***TYRE YARNS, CORDS AND TYRE CORD FABRICS MADE
FROM MAN-MADE FIBRES — METHODS OF TEST****PART 2 LINEAR DENSITY***(Second Revision)***1 SCOPE**

This standard (Part 2) prescribes a method for determination of linear density of man-made fibre tyre yarns and cords taken from cheeses, cones, bobbins, spools, hanks, or tyre cord fabrics.

2 REFERENCE

The standards listed in Annex A contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed as in Annex A.

3 PRINCIPLE

3.1 The mass of a specified length of yarn or cord is determined and linear density is calculated and expressed as denier or tex. The sample is first conditioned and its length is measured.

4 SAMPLING

4.1 Sample from the lot shall be drawn so as to be representative of the lot. Sample drawn in accordance with the relevant material specification or as agreed to between the buyer and the seller shall be held to be representative of the lot.

5 CONDITIONING OF TEST SAMPLE

5.1 Unless otherwise agreed to between the buyer and the seller, the test sample shall be conditioned to a state of moisture equilibrium from the dry side in standard atmosphere as prescribed in IS 6359.

NOTE — When a test sample under zero tension has been left in such a way as to expose, as far as possible, all portions of it to the standard atmosphere for 24 h, the test sample shall be deemed to have reached a state of moisture equilibrium.

6 ATMOSPHERIC CONDITIONS FOR TESTING

6.1 The test shall be carried out in the standard atmosphere (*see 5.1*)

7 APPARATUS**7.1 Pan Balance and Weights**

The balance shall be of sufficient capacity to weigh the specimen required for the purpose and capable of weighing the specimen to an accuracy of 1 mg.

7.2 Drying Oven

It shall be provided with forced ventilation and capable of maintaining a temperature of $(105 \pm 3) ^\circ\text{C}$ preferably provided with a weighing balance. In case the drying oven is not provided with weighing balance, a desiccator with a suitable desiccant and sealed containers of known mass will also be required.

7.3 Wrap Reel

7.3.1 It shall be capable of winding exact lengths under required tensions.

7.3.2 In case of non-availability of the wrap reel and for yarn or cord taken from tyre cord fabric an alternate device capable of measuring the straightened lengths of yarn shall be used. It shall be provided with two clamps, the distance between which shall be adjustable and through one of which, a known tension could be applied. Each clamp shall consist of two jaws, preferably metallic which have parallel gripping surfaces.

8 PREPARATION OF TEST SPECIMENS

8.1 From each conditioned sample, suitable lengths of yarn or cord subject to a minimum of 9 m shall be reeled off without alteration of twist, keeping a standard pre-tension of $(5 \pm 1) \text{ mN/tex}$ [$(0.05 \pm 0.01) \text{ g/d}$] so that the mass of each specimen is at least 5 g, discarding a few metres of yarn or cord after taking each specimen. The length shall be measured to an accuracy of 0.1 percent.

NOTE — It is recommended that the lengths be taken in multiples of 10 m (for tex) and 9 m (for denier).

8.1.1 If an apparatus of the type described in **7.3.2** is used, as many straightened lengths under standard pre-tension shall be measured and cut as will make the designed total length and mass stated in **8.1**.

9 PROCEDURE

9.1 Place the sample in the ventilated drying oven, maintained at $(105 \pm 3) ^\circ\text{C}$ and fed with air from standard atmosphere. Continue drying until constant mass is attained. The mass shall be taken as constant when the difference between two successive weighings made at intervals of 20 minutes is less than 0.1 percent. Weighings should be correct to 1 mg.

10 CALCULATIONS

10.1 Calculate the linear density for each specimen by one of the following formulae:

$$\text{a) Tex} = (100 + R) \times \frac{10W}{L}$$

$$\text{b) Denier} = (100 + R) \times \frac{90W}{L}$$

where

R = standard moisture regain for the fibre being tested in percentage, (see Annex B of IS 17261);

W = oven-dry mass of specimen in g; and

L = length of specimen in m.

NOTE — The standard moisture regain is also sometimes termed as commercial moisture regain in

the trade. Unless otherwise agreed to between the buyer and the seller, standard moisture regain value for specified fibres as given below may be used.

<i>SI No.</i>	<i>Material</i>	<i>Commercial Moisture Regain, Percent</i>
i)	Natural cotton yarn	7.0
ii)	Rayon	11
iii)	Nylon (Polyamide)	4.5
iv)	Polyester	0.4

10.2 Find out the mean of the linear density values, obtained in **10.1**.

11 REPORT

11.1 The report shall include the following information:

- The type of material;
- Linear density;
- Number of tests;
- Standard moisture regain used; and
- Temperature used for conditioning that is, $(27 \pm 2) ^\circ\text{C}$ or $(20 \pm 2) ^\circ\text{C}$.

ANNEX A (Clause 2)

LIST OF REFERRED INDIAN STANDARDS

<i>IS No.</i>	<i>Title</i>
IS 6359 : 1971	Method for conditioning of textiles
IS 17261 : 2022	Textiles — Polyester continuous filament fully drawn yarns — Specification (<i>first revision</i>)

ANNEX B
(Foreword)

COMMITTEE COMPOSITION

Technical Textiles for Mobiltech Sectional Committee, TXD 38

<i>Organization</i>	<i>Representative(s)</i>
Northern India Textile Research Association, Ghaziabad	DR M. S. PARMAR (Chairperson)
Arvind Limited, Ahmedabad	SHRI PABITRA SAHOO SHRIMATI MAMTA CHAUDHARY (<i>Alternate</i>)
Autoliv India Ltd, Mysore	SHRI DEEPAK RAO
BMD Pvt Ltd, Banswara	DR NAVDEEP K. PHOGAT
Century Enka Limited, Pune	SHRI MILIND ASHTAPUTRE SHRI KRISHNAGOPAL LANDSARIA (<i>Alternate</i>)
Federation of Indian Chambers of Commerce and Industry, New Delhi	SHRI TUSHAR PATEL SHRI MAHENDRA HADA (<i>Alternate</i>)
Garware Technical Fibres Limited, Pune	DR ABHAY GUPTA
ICAR - Central Institute for Research on Cotton Technology, Mumbai	DR G. KRISHNA PRASAD DR A. ARPUTHARAJ (<i>Alternate</i>)
Indian Technical Textile Association, Mumbai	DR ANUP RAKSHIT SHRI ANKIT DESAI (<i>Alternate</i>)
Kusumgar Corporates Pvt Ltd, Mumbai	SHRI SIDDHARTH Y. KUSUMGAR DR M. K. TALUKDAR (<i>Alternate</i>)
Metro Tyres Ltd, Ludhiana	SHRI SAMIR MAYRA
Northern India Textile Research Association, Ghaziabad	SHRIMATI NEHA KAPIL
Office of the Textile Commissioner, Mumbai	SHRI V. K. KOHLI SHRI HUMAYUN. K. (<i>Alternate</i>)
SGS Limited, Gurugram	SHRI GAURAV SARSWAT SHRI ASHISH SARSWAT (<i>Alternate</i>)
SRF Limited, Gurugram	SHRI ANKUR SHARMA SHRI BHARATH KUMAR (<i>Alternate</i>)
Testtex India Laboratories Pvt Ltd, Mumbai	SHRIMATI MEETA SHINGALA SHRI DIPTI RANJAN PRUSTY (<i>Alternate</i>)
Textiles Committee, Mumbai	SHRI KARTIKAY DHANDA SHRIMATI SHILPI CHAUHAN (<i>Alternate</i>)
The Synthetic and Art Silk Mills Research Association, Mumbai	SHRI SANJAY SAINI SHRI PREMNATH SURWASE (<i>Alternate</i>)
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VOICE, New Delhi	SHRI M. A. U. KHAN SHRI B. K. MUKHOPADHYAY (<i>Alternate</i>)
BIS Directorate General	SHRI J. K. GUPTA, SCIENTIST 'E'/DIRECTOR AND HEAD (TEXTILES) [REPRESENTING DIRECTOR GENERAL (<i>Ex-officio</i>)]

Member Secretary
SHRI BANOTHU RANGA
SCIENTIST 'B'/ASSISTANT DIRECTOR
(TEXTILES), BIS

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